

PATENT

REMARKS

Applicants previously presented claims 1-3, 5-16, 18-22, and 24-28 for examination. In the above-identified Office Action, the Examiner has rejected all the claims. By this amendment, Applicants have amended claims 1, 5, 6 and 16; cancelled claims 26; and added new claim 27. Accordingly, claims 1-3, 5-16, 18-22, 24, 25 and 27 remain pending. Applicants respectfully request that the Examiner reconsider the application in light of the amendments and the remarks expressed herein.

Interview summary

Applicants appreciate the Examiner for the courtesies extended to Applicants' representative at the March 11 interview. The main issue discussed at the interview was on increasing beam width via increasing frequency. The Examiner requested explanation in this response. Applicants have complied with the requirements as below. No agreement was made at the interview.

103 Rejections regarding the claims

All the claims were rejected under 35 U.S.C. 103(a) as being unpatentable as follows:

- (a) claims 1-3, 5-7, 9 and 13 over Pompei (US Pub. No. 2001/0007591) in view of Takahashi et al. (US Pat. No. 6,643,377, hereinafter referred to as "Takahashi") and further in view of Kuriyama et al. (JP Pub. No. 1-109898);
- (b) claim 8 over Pompei in view of Takahashi, and in further view of Kuryama, and in further view of Norris et al. (US Pub. No. 2004/0052387 A1, hereinafter referred to as "Norris");
- (c) claims 10 and 12 over Pompei in view of Takahashi, in further view of Kuriyama, and in further view of Wiser et al. (US Pub. No. 2003/0009248 A1, hereinafter "Wiser");

PATENT

- (d) claim 11 over Pompei in view of Takahashi, in further view of Kuriyama, and in further view of Wiser and Brain (Brain; Marshall, How USB Ports Work, October 11, 2002, www.howstuffworks.com/usb);
- (e) claim 14 over Pompei in view of Takahashi, in further view of Kuriyama, and in further view of Tokumo et al. (US Patent No. 4,478,571);
- (f) claim 15 over Pompei in view of Takahashi, in further view of Kuriyama, and in further view of Tanaka et al. (US Pat. No. 4,823,908, hereinafter "Tanaka"); and
- (g) claims 16, 18-20 and 22-24 over Pompei in view of Kuriyama.

Applicants respectfully disagree with all of the rejections.

All of the 103(a) rejections are based on combining Pompei and Kuriyama with other references. In certain claims, up to 5 references were combined. Initially, it is submitted that there is no motivation to combine any of these references in the manner that the Office Action proposes.

No teaching or suggestion of a beam-attribute control unit of an ultrasonic directional speaker receiving wireless inputs to control the ultrasonic frequency of the speaker so that if the ultrasonic frequency is increased, the attenuation and the beam width are also increased

The Office Action, in its pages 5 and 12, argued that Pompei at paragraph 39 taught that "the phased array may be used to generate a frequency-dependent beam distribution, in which modulated ultrasonic beams with different frequencies propagate through the air along different projection paths"; since Pompei disclosed "different frequencies, whenever the frequency is increased, the beam width and attenuation inherently increase as well since it is known in the art that ultrasonic waves have decreasing directivity as frequency increases."

Applicants respectfully disagree.

Pompei teaches using a phased array for a parametric audio system. The system is based on modulating a single carrier signal and applying a relative phase shift across the modulated carrier signal. Though the modulated carrier

PATENT

signal may be able to propagate along different projection paths, Pompei does not teach or suggest changing the ultrasonic frequency to change the beam width.

Applicants disagree with the self-serving statement in the Office Action that as frequency increases, directivity decreases. The examiner is respectfully requested in accordance with MPEP 2144.03 to cite one or more references in support of his assertions particularly when, in numerous situations, as frequency increases, directivity increases.

The unexpected results of increasing frequency to increase the beam width arise from the application of the KZK equation, for example, as Equation 20 in "Equations of nonlinear acoustics," by V.P. Kuznetsov, in lines 14-15 of paragraph 89 of Applicants' specification. Based on the KZK equation, Applicants have generated Figures 9E, 9F and 9G in the specification. As shown by the figures, the beam widths of the beam at 40 kHz carrier frequency (Figure 9E) is narrower than the beam widths of the beam at 100 kHz carrier frequency (Figure 9F), which in turn is narrower than the beam widths of the beam at 200 kHz carrier frequency (Figure 9G).

As stated in the second to the last sentence in paragraph 90 of Applicants' specification, one explanation for such unexpected results based on the KZK equation can be that "higher acoustic attenuation reduces the length of the virtual array of speaker elements, which tends to broaden the beam pattern."

Pompei, or any other cited references, have not been taught or suggested such unexpected results. Thus, such limitations could not have been obvious based on any of the cited references, singly or in any combination, let alone the limitations of a beam-attribute control unit of an ultrasonic directional speaker receiving wireless inputs to control the ultrasonic frequency of the speaker so that if the ultrasonic frequency is increased, the attenuation and the beam width are also increased, in Applicants' independent claims.

PATENT

No teaching or suggestion of controlling the ultrasonic frequency including by selecting a carrier frequency from a predetermined set of carrier frequencies

In Pompei, the phase shifts are applied by the transducers shown in Pompei's Fig. 2a and Fig. 2b. All the different transducers operate on a single carrier frequency. If the different transducers in Pompei were to operate on different carrier frequencies, the outputs from the different transducers would not interfere and would therefore not function correctly.

Thus there is no teaching or suggestion in Pompei of controlling its ultrasonic frequency including by selecting a carrier frequency from a predetermined set of carrier frequencies. Examples of such teachings can be found, for example, in Applicants' application, such as in paragraph 72 to paragraph 85.

With Pompei not teaching or suggesting controlling its ultrasonic frequency including by selecting a carrier frequency from a predetermined set of carrier frequencies, Pompei could not possibly have taught or suggested selecting such a carrier frequency to control the width of its beam, as in Applicants' claimed invention.

Not only that the cited references should not be combined as suggested, there is also no teaching or suggestion in Pompei, Takahashi, Kuriyama, and any of the other cited references, singly or in any combination, of controlling an ultrasonic frequency to change the beam width, with the control including by selecting a carrier frequency from a predetermined set of carrier frequencies, as recited in Applicants' independent claims 1 and 16, or their corresponding dependent claims 2-3, 5-16, 18-22, 24 and 25.

Based on the foregoing, it is submitted that the claims 1-3, 5-16, 18-22, 24 and 25 are patentably distinct from all the cited references. Further the independent or the dependent claims recite additional elements which when taken in the context of the claimed invention further patentably distinguish the art

PATENT

of record. The additional limitations recited in the independent claims or the dependent claims are not further discussed as the above-discussed limitations are clearly sufficient to distinguish the claimed invention from the cited references. Thus, it is respectfully requested that the Examiner withdraw the rejection of claims 1-3, 5-16, 18-22, 24 and 25 under 35 USC §103(a).

Summary

It is submitted that claims 1-3, 5-16, 18-22, 24 and 25, together with the newly added claim 27, are patentably distinct from the cited references. Reconsideration of the application and an early Notice of Allowance are earnestly solicited.

In the event that the Examiner, upon reconsideration, determines that an action other than an allowance is appropriate, the Examiner is requested and authorized to telephone Applicants' representative below prior to taking such action, if the Examiner feels that such a telephone call will advance the prosecution of the present application.

If there are any issues remaining which the Examiner believes could be resolved through either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned representative at the telephone number listed below.

Respectfully submitted,

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